U.S. Department
of Transportation
**Research and
Special Programs
Administration**

400 Seventh St., S.W.
Washington, D.C. 20590

OCT 17 2001

DOT-E 8927
(FOURTH REVISION)

EXPIRATION DATE: September 30, 2003

(FOR RENEWAL, SEE 49 CFR § 107.109)

1. GRANTEE: Pacific Scientific Company
HTL/KIN-Division
Duarte, California

2. PURPOSE AND LIMITATION:

a. This exemption authorizes the transportation in commerce of certain Division 2.2 hazardous materials in non-DOT specification, small, high pressure spheres of welded construction, for aircraft or military weapons use only. This exemption provides no relief from any Hazardous Materials Regulations (HMR) other than as specifically stated herein.

b. The safety analyses performed in development of this exemption only considered the hazards and risks associated with transportation in commerce.

3. REGULATORY SYSTEM AFFECTED: 49 CFR Parts 106, 107 and 171-180.

4. REGULATIONS FROM WHICH EXEMPTED: 49 CFR §§ 173.302(a), and 175.3, except as specified herein.

5. BASIS: This exemption is based on the application of the *Pacific Scientific Company* dated *September 10, 2001*, submitted in accordance with § 107.109.

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6. HAZARDOUS MATERIALS (49 CFR § 172.101):

Proper Shipping Name/ Hazardous Materials Description	Hazard Class/ Division	Identification Number	Packing Group
Helium, compressed	2.2	UN1046	N/A

7. SAFETY CONTROL MEASURES:

a. PACKAGING - Prescribed packaging is a nonrefillable non-DOT specification girth-welded steel spheres in accordance with HTL design specifications on file in the Office of Hazardous Materials Exemptions and Approvals (OHMEA), and in full compliance with DOT Specification 3HT except as follows:

178.44(a) - Type, size and service pressure.

The sphere may be girth-welded and have one endfitting welded as shown n HTL drawing 32197872 Rev. O dated September 3, 1982 or drawing 32197943 Rev. D dated January 3, 1986. Maximum water capacity is 46 cubic inches with a maximum service pressure of 8,000 psi.

178.44(b) - Authorized steel.

Type ARMCO Nitronic 40 (21-6-9) austenitic stainless steel with the following composition is authorized with proper welding procedure.

CHEMICAL ANALYSIS

	Percent
Carbon	0.040 max.
Manganese	8.00/10.00
Phosphorus	0.060 max.
Sulfur	0.030 max.
Silicon	1.00 max.
Chromium	19.00/21.50
Nickel	5.50/7.50
Nitrogen	0.15/0.40

TYPICAL MECHANICAL PROPERTIES

Condition	Ultimate Tensile (PSI)	Yield Strength (PSI)	Elongation Percent In 2 inches
Annealed	112,000	68,000	44
20% Cold Reduction	150,000	120,000	18

178.44(d) - Manufacture.

(Added) Each sphere must be subjected to a process treatment after welding and before stress relieving by hydrostatically pressurizing to at least 100 percent but not more than 110 percent of the test pressure, and maintained at this pressure for 3 minutes. The process treatment must be witnessed by the independent inspector. Total and permanent expansion for this process treatment need not be recorded.

178.44(e) - Welding or brazing.

Welding as prescribed in § 178.44(a) of this exemption, is authorized. All pressure welds must be 100 percent radiographed after hydrostatic test.

178.44(f) - Wall thickness.

(1) Applies except that the minimum wall thickness must be such that the wall stress at the minimum specified test pressure must not exceed 116,500 psi.

(2) and (3) Not applicable.

(4) (Added) Calculations for spheres must be made by the formula:

$S = PD/4tE$; where

E = 0.85 which must be applied to the girth weld area and the heat affected zones which zones

must extend a distance of at least 6 times wall thickness from the center of the weld.

E = 1.0 for all other areas

178.44(g) - Heat treatment.

The half spheres may be stress relieved or annealed for forming. Welded spheres must be stress relieved at a temperature of 900°F ± 25°F for one hour. Stress relieving is to be done after process treatment, and before hydrostatic test.

178.44(j) - Cycling test.

Applies except the test on each lot is not required. Results of design qualification testing per § 178.44(p)(4) of this exemption must be submitted to the OHMEA prior to initial shipment.

178.44(l) - Flattening test.

Test one sphere taken at random from each lot by flattening between parallel steel plates at the weld with the welded seam at right angle to the plate.

178.44(m) - Physical tests - Not required.

178.44(n) - Magnetic particle inspection.

Not required. Instead, each sphere must be inspected using apparatus and procedures for liquid penetrant examination in accordance with ASTM-E-165-65. Inspection must be performed externally on the finished container after the hydrostatic test. Evidence of discontinuities, which in the opinion of the independent inspector may appreciably weaken or decrease the durability of the sphere, must be cause for rejection.

178.44(p) - Acceptable results of tests.

(1) Flattening required without cracking to ½ the diameter of the sphere.

(2) Physical tests: Not required.

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the diameter of the sphere.

(2) Physical tests: Not required.

(3) Burst pressure must be at least 4/3 times the test pressure. Actual burst pressure must be recorded.

(4) Cycling: The design must be qualified by cycling 3 spheres from zero to service pressure to at least 35,000 pressurizations without evidence of distortion or failure.

178.44(q) - Rejected spheres.

(1) Repair of welded seams by welding prior to process treatment authorized; subsequent thereto containers must be heat-treated and pass all prescribed tests.

(2) For each cylinder subjected to reheat treatment during original manufacture, sidewall measurements must be made to verify that the minimum sidewall thickness meets specification requirements after the final heat treatment.

178.44(r) - Marking.

Spheres must be marked by electro-etching. Instead of DOT-3HT, cylinders must be marked "DOT-E 8927" followed by the service pressure. Stamping of elastic expansion is not required. Nameplates are not authorized.

b. OPERATIONAL CONTROLS -

1. Approval of the pressure relief device required by § 173.34(d) must be submitted to the OHMEA prior to initial shipment.

2. The spheres are restricted to use in military weapons systems.

3. The spheres must be shipped in strong outside packagings in conformance with § 173.301(k).

4. The spheres may not be refilled and reshipped.

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8. SPECIAL PROVISIONS:

a. A person who is not a holder of this exemption who receives a package covered by this exemption may reoffer it for transportation provided no modifications or changes are made to the package and it is reoffered for transportation in conformance with this exemption and the HMR.

b. A current copy of this exemption must be maintained at each facility where the package is offered or reoffered for transportation.

9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle, rail freight, cargo aircraft only, and passenger-carrying aircraft.

10. MODAL REQUIREMENTS: A current copy of this exemption must be carried aboard each aircraft used to transport packages covered by this exemption. The shipper must furnish a copy of this exemption to the air carrier before or at the time the shipment is tendered.

11. COMPLIANCE: Failure by a person to comply with any of the following may result in suspension or revocation of this exemption and penalties prescribed by the Federal hazardous materials transportation law, 49 U.S.C. 5101 et seq:

- All terms and conditions prescribed in this exemption and the Hazardous Materials Regulations, 49 CFR Parts 171-180.
- Registration required by § 107.601 et seq., when applicable.

Each "Hazmat employee", as defined in § 171.8, who performs a function subject to this exemption must receive training on the requirements and conditions of this exemption in addition to the training required by §§ 172.700 through 172.704.

No person may use or apply this exemption, including display of its number, when the exemption has expired or is otherwise no longer in effect.

12. REPORTING REQUIREMENTS: The carrier is required to report any incident involving loss of packaging contents or packaging failure to the Associate Administrator for Hazardous Materials Safety (AAHMS) as soon as practicable. (Sections 171.15 and 171.16 apply to any activity undertaken under the authority of this exemption.) In addition, the holder(s) of this exemption must inform the AAHMS, in writing, of any incident involving the package and shipments made under the terms of this exemption.

Issued in Washington, D.C.:

OCT 17 2001

for Robert A. McGuire (DATE)
Associate Administrator for
Hazardous Materials Safety

Address all inquiries to: Associate Administrator for Hazardous Materials Safety, Research and Special Programs Administration, Department of Transportation, Washington, D.C. 20590.
Attention: DHM-31.

The original of this exemption is on file at the above office. Photo reproductions and legible reductions of this exemption are permitted. Any alteration of this exemption is prohibited.

PO: sdc